



VISHWAKARMA
UNIVERSITY

Maximising Human Potential

Faculty of Science & Technology

Programme Structure & Syllabus

For

Third Year

Bachelor of Technology

Computer Engineering

Programme Code: BTECCE

Pattern 2022

< With Effect from Academic Year 2024-25 >

	Authority	Date
Proposed by	Board of Studies in Computer Engineering	
Approved by	Academic Council, Vishwakarma University, Pune	

Issued by

Chairman – BoS

Dean of Faculty

Director, IQAC

Title: Programme Structure and Syllabus

Form No: IQAC-101

Vision of the University	
Emerge as a Premier University Recognized Internationally for Excellence in Education, Research and Innovation	
Mission of the University	
VU-M1	To impart contemporary transformative education through research and innovation
VU-M2	To develop competent leaders-professionals for life and livelihood
VU-M3	To co-create human and socio-economic capital par excellence
VU-M4	To inculcate life skills and holistic culture appreciating morals and ethics
Values of the University	
Excellence	Transparency
Innovation	Sustainability
Diversity	Responsibility
Adaptability	Compassion

Vision of the Department of Computer Engineering	
To create an intellectual and academically rich environment for careers in Computing Education and Research to fulfill global needs.	
Mission of the Department of Computer Engineering	
M1	To impart modern computing education through novel methods and research.
M2	To prepare the students for life-long learning in pursuit of excellence.
M3	To create technically competent human in socio-economic domain.
M4	To promote aspiring ethically conscious engineers demonstrating sustainable entrepreneurship and professional maturity in social context.
Values of the Department of Computer Engineering	
Pursuing Excellence	Ethics & Social Responsibility
Nurturing Talent	Collaborative Approach
Career Architect	Sustainable Growth Transparency & Accountability
Innovative Outlook	Freedom of Expression

Mapping of Mission Statement of Department to University Mission Statement

Mission Statement	VU-M1	VU-M2	VU-M3	VU-M4
M1	3	3	2	2
M2	1	2	2	3
M3	2	3	2	2
M4	1	1	2	3

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

Programme Educational Objectives (PEOs)

PEO No.	Statement
PEO1	To prepare the students to evolve into a professional and committed technology workforce, by providing them with a global educational platform with innovative practices.
PEO2	To provide a sufficient mathematical and computing theory knowledge base, leading to practical and long lasting computer engineering solutions.
PEO3	To ingrain problem solving skills and sound engineering principles in students with the help of modern tools and techniques.
PEO4	To impart in the students professional and ethical practices based on standard guidelines to acquire the right attitude and aptitude for the benefit of society.
PEO5	To guide ambitious students for higher education and lead them to avenues of entrepreneurship in emerging areas of computing.

Mapping of Mission Statement of Department to PEOs

Mission Statement	PEO1	PEO2	PEO3	PEO4	PEO5
M1	3	3	3	1	2
M2	2	2	3	3	2
M3	3	3	2	2	1
M4	2	1	2	3	2

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

Programme Outcomes (POs)

PO No.	Statement
PO1	Apply the knowledge of engineering and science fundamentals to the solution of complex engineering problems.
PO2	Identify, formulate and analyze complex engineering problems to create solutions using the First principles of engineering sciences and mathematics.
PO3	Design solutions for design system components that meet the specified needs for the benefit of society.
PO4	Apply research methods including design of experiments, analysis and interpretation of data, And synthesis of the information to provide valid conclusions.
PO5	Create appropriate techniques and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning using contextual knowledge to assess the needs of society and understand The responsibilities relevant to the professional engineering practice.
PO7	Understand the impact of professional engineering solutions as applied to the environment, And demonstrate the knowledge for sustainable development.
PO8	Adopt ethical practices as applied to the professional world to execute responsibilities and adhere to norms of the engineering profession.
PO9	Execute professional functions effectively as an individual, as well as a leader or member in Diverse multidisciplinary teams.
PO10	Communicate effectively with the engineering community and with society in solving complex problems in terms of being able to comprehend and write effective reports, make Effective presentations, as well as execute and receive clear instructions.
PO11	Demonstrate an ability to lead projects and build cost models in an interdisciplinary professional Setting
PO12	Develop learning mechanisms and inculcate the ability to prepare for lifelong learning in the context of technological change.

Mapping of PEOs to POs

PEO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	2	3	2	3	1	2	3	1	1	-	-	2
PEO2	3	3	2	3	1	1	2	1	-	1	1	1
PEO3	2	2	2	2	3	1	3	1	-	1	-	2
PEO4	1	1	1	1	1	1	1	3	3	2	2	-
PEO5	2	2	2	2	1	1	1	1	1	-	2	1

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

Programme Specific Outcomes (PSOs)

PSO No.	Statement
PSO1	Imbibe foundational knowledge of computing theory, algorithms and programming paradigms to create innovative, scientific solutions for complex computing challenges.
PSO2	Prepare for the latest trends in industry by adapting to various computing platforms, architectures and changing software paradigms.
PSO3	Evolve new design ideas for real world problems using appropriate mechanisms, design patterns, modeling methods and modern tools.
PSO4	Inculcate research attitude and aptitude in students using techniques and standards as applied to technology migration and evolution.

Mapping of PEOs to PSOs

PEO Number	PSO1	PSO2	PSO3	PSO4
PEO1	2	3	1	2
PEO2	3	2	1	3
PEO3	3	2	3	2
PEO4	2	2	1	1
PEO5	2	2	1	2

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

Programme Structure

Faculty	<i>Science and Technology</i>	Pattern	2022
Department	<i>Computer Engineering</i>	Date (w.e.f.)	01/07/2024
Programme	<i>B.Tech. Computer Engineering</i>		

Semester -V									
Course Type	Course Code	Course Name	Teaching Scheme(Hours/Week)			Credit	Examination Scheme and Marks		
			L	T	P		CIE	ESE	Total
PCC	BTECCE22501	Design and Analysis of Algorithms	3	0	0	3	50	50	100
PCC	BTECCE22502	Operating Systems	3	0	0	3	50	50	100
PCC	BTECCE22503	Computer Networks	3	0	0	3	50	50	100
PCC	BTECCE22504	System Programming	3	0	0	3	50	50	100
LC	BTECCE22505	Operating Systems - Lab	0	0	2	1	25	25	50
LC	BTECCE22506	Computer Networks - Lab	0	0	2	1	25	25	50
LC	BTECCE22507	System Programming Lab	0	0	2	1	25	25	50
PCC	BTECCE22508	Data Warehouse and Data Mining	3	0	0	3	50	50	100
LC	BTECCE22509	Data Warehouse and Data Mining Lab	0	0	2	1	25	25	50
HSMC	***	Humanities Elective	2	0	0	2	50	0	50
GIC	VUGIC510	Aptitude Development-1	0	0	0	0	0	0	0
TOTAL			17	0	8	21	400	350	750
Instructions, if any: 1 Theory/Tutorial Hour = 1 Credit, 2 Practical hours = 1 Credit									

*** Humanities Elective	
BTECCE22510	Economics
BTECCE22511	Project Management

Semester -VI									
Course Type	Course Code	Course Name	Teaching Scheme(Hours/Week)			Credit	Examination Scheme and Marks		
			L	T	P	C	CIE	ESE	Total
PCC	BTECCE22601	Software Engineering	3	0	0	3	50	50	100
PCC	BTECCE22602	Artificial Intelligence	3	0	0	3	50	50	100
PCC	BTECCE22603	Compiler Design	3	0	0	3	50	50	100
LC	BTECCE22604	Software Engineering Lab	0	0	2	1	25	25	50
LC	BTECCE22605	Artificial Intelligence Lab	0	0	2	1	25	25	50
LC	BTECCE22606	Compiler Design Lab	0	0	2	1	25	25	50
PCC	BTECCE22607	Business Intelligence	3	0	0	3	50	50	100
LC	BTECCE22608	Business Intelligence Lab	0	0	2	1	25	25	50
PCC	BTECCE22609	*# Network and cloud security	3	0	0	3	50	50	100
LC	BTECCE22610	*# Network and cloud security Lab	0	0	2	1	25	25	50
PROJ	BTECCE22620	Project Stage 1	0	0	0	4	50	50	100
GIC	VUGIC511	Aptitude Development-2	0	0	0	0	0	0	0
TOTAL			15	0	10	24	425	425	850
Instructions, if any: 1 Theory/Tutorial Hour = 1 Credit, 2 Practical hours = 1 Credit									

Name of Head of Department

Sign:

Date:

Name of Dean

Sign:

Date:

SEM V

BTECCE22501::Design and Analysis of Algorithms

Course Type	PCC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	100
Total	3Hr./Week	Total	3		

Course Description

This course will help students to understand and apply the algorithm analysis techniques and efficiency of alternative algorithmic solutions for the same problem. It will also identify different algorithm design techniques and algorithm analysis techniques.

Course Outcomes

CO No.	Statement
1	Analyze the performance of algorithms.
2	Choose appropriate algorithm design techniques for solving problems.
3	Understand how the choice of data structures and the algorithm design methods impact the performance of programs along with the principle of optimality.
4	Illustrate various problems using backtracking.
5	Compare different methods of branch and bound strategy.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																AP
CO2		3															AP
CO3					2												AN
CO4						3											AN
CO5															3		AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Basic introduction, time complexity analysis	Hours 10	CO	BTL
	Basic introduction, time complexity analysis, Asymptotic notations (Big Oh, small oh, Big Omega, Theta notations). Best case, average case, and worst case time and space complexity of algorithms. Overview of searching, sorting algorithms. Adversary lower bounds (for comparison based sorting).		1	AP

Recurrence relations: Substitution method, Recursion Tree method, Master's theorem and applications. Mathematical Induction to get asymptotic bounds on time complexity. Proving correctness of algorithms.				
Unit No 2	Divide and Conquer	Hours 9	2	AP
Analyzing Quick sort, Randomized Quick sort, Merge sort, Counting Inversions, Finding majority element, Finding Median, Efficient algorithms for Integer arithmetic - Euclid's algorithm, Finding closest pair of points in plane, Computing convex hull of points in plane, Graham's scan algorithm				
Unit No 3	Greedy Technique and Dynamic Programming	Hours 10	3	AP
Greedy method: General method, Applications: Fractional Knapsack problem, 0/1 Knapsack problem, Coin changing problem, Container loading problem, Job sequencing with deadlines. Minimum cost spanning trees: Prim's algorithm and Kruskal's Algorithm, Single source shortest path problem: Dijkstra's algorithm & Bellman Ford Algorithm, Optimal Merge pattern, Huffman Trees. Dynamic programming: Principle of optimality, Stassen's method for Matrix multiplication, Floyd's algorithm, Multi stage graph, Optimal Binary Search Trees, Knapsack Problem.				
Unit No 4	Backtracking Strategy	Hours 7	4	AN
Backtracking: General strategy, N-queens problem, graph coloring, subset sum problem, Knapsack problem, Hamiltonian cycle.				
Unit No 5	Branch and Bound	Hours 9	5	AN
Branch and Bound: General Method, applications - 0/1 Knapsack problem, LC Branch and Bound solution, FIFO Branch and Bound solution, Travelling sales person problem. NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, NP-Hard and NP-Complete classes, Cook's theorem.				

Textbooks

1	"Fundamentals of Data Structures in C", E. Horowitz, S. Sahni, Anderson-Freed, Second Edition, Universities Press.
2	"Data structures using C and C++", Y. Langsam, M.J. Augenstein, A.M.Tanenbaum, Pearson Education, Second Edition

Reference Books / Journal Articles / Weblink

1	"An Introduction to Data Structures with applications", J. Tremblay, P. Sorenson, TMH Publication, 2nd Edition.2.
2	"C and Data Structures", E. Balaguruswamy, TMH Publication, 2003.
3	"Data Structures and Algorithm Analysis in C++", M. Weiss, Pearson Education, Second Edition, 2002.
4	"Data Structures using C", ReemaThareja, Second Edition, Oxford Publications
5	"Data Structures with C", Schaum's online series, SaymourLipschutz, McGraw Hill Publications.
7	"Data Structures and analysis in C", Mark Allen Weiss, second Edition, Pearson Publication

BTECCE22502:: Operating Systems

Course Type	PCC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3Hr./Week	Lecture	3	CIE Marks	50
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	0Hr./Week	Practical/Studio	0	Total Marks	100
Total	3Hr./Week	Total	3		

Course Description

This course helps the student to identify the role of operating systems and explain the different structures of operating systems. It highlights the OS support for processes and threads, depicts scheduling algorithms and deadlock mechanisms. It also identifies virtual memory requirement of an operating system and illustrates the importance of I/O and file systems.

Course Outcomes

CO No.	Statement
1	Examine the functions of a contemporary Operating system with respect to convenience, efficiency and the ability to evolve.
2	Demonstrate knowledge in applying system software and tools available in modern operating system, such as threads, system calls, semaphores for software development.
3	Apply various CPU scheduling algorithms and identify deadlock mechanisms to construct solutions to real world problems.
4	Understand the organization of memory and memory management hardware.
5	Analyze I/O and file management techniques for better utilization of secondary memory.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	2																UN
CO2		2															AN
CO3						3											AP
CO4							3										AN
CO5															3		AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Introduction	Hours 9	CO	BTL
	Introduction to OS: What is OS, Interaction of OS and hardware, Goals of OS, Basic functions of OS, OS Services, System Calls. Types of OS: Batch, Multiprogramming, Time sharing, Parallel, Distributed & Real-time OS. Shell: Linux commands and shells, shell programming, AWK programming. Introduction to Mobile OS: Architecture & Overview of Android OS.		1	UN
Unit No 2	Process Management	Hours 9	2	AN
	Processes: Process Concept, Process State Model, Process Description, Process Control Threads: Multithreading models, Symmetric Multiprocessing, User level and kernel level threads, Microkernels. Concurrency: Issues with concurrency, Principles of Concurrency Mutual Exclusion: H/W approaches, S/W approach, OS/Programming Language support: Semaphores, Mutex, Message passing, Monitors. Classical Problems of Synchronization: Readers-Writers problem, Producer Consumer problem, Dining Philosopher problem.			
Unit No 3	CPU Scheduling and Deadlock	Hours 9	3	AP
	Uniprocessor Scheduling: Types of Scheduling - Preemptive, Non-preemptive, Long-term, Medium-term, Short-term, Scheduling Criteria. Scheduling Algorithms: FCFS, SJF, RR, Virtual Round Robin, Priority Multiprocessor Scheduling: Granularity, Design Issues, Process Scheduling Deadlock: Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Deadlock Recovery.			
Unit No 4	Memory Management	Hours 9	4	AN
	Memory Management concepts: Memory Management requirements Memory Partitioning: Fixed, Dynamic Partitioning, Buddy Systems. Placement Strategies: First Fit, Best Fit, and Worst Fit. Fragmentation, Swapping, Thrashing. Virtual Memory: Concepts, Address translation, VM with Paging, Page Table Structure, Translation Look-aside Buffer, VM with Segmentation, Working Set Page Replacement Policies: FIFO, LRU, Optimal.			
Unit No 5	I/O & Device Management	Hours 9	5	AP
	I/O management: I/O Devices - Types, Characteristics of Serial and Parallel devices, OS design issues for I/O management, I/O Buffering. Disk Scheduling: FCFS, SCAN, C-SCAN, SSTF. File Management: Concepts, File Organization, File Directories, File Sharing. Record Blocking, Secondary Storage Management, Free Space management, Security. File System: Structure, Implementation, and Memory mapped files.			

Textbooks

1	“Operating Systems”, Stalling William, Pearson Education, ISBN: 0-13-031999-6, 5 th Edition.
2	“Operating System Concepts”, Silberschatz A., Galvin P., Gagne G., John Wiley and Sons, ISBN: 9971-51-388-9, 6 th Edition.

Reference Books / Journal Articles / Weblink

1	“Modern Operating Systems”, Tanenbaum Andrew S., Prentice Hall India, ISBN: 81-7808-447-3, 2 nd Edition.
2	“Unix Concepts and Applications”, Das Sumitabha, Tata McGraw Hill, ISBN: 0-07-053475-6, 3 rd Edition.
3	“Unix Shell Programming”, Yashavant Kanetkar, BPB Publications, ISBN: 81-7029-753-2, 1 st Edition.
4	“Computer Architecture and Organization”, John Hayes, Tata McGraw Hill, ISBN: 0-07-027355-3, 3 rd Edition.

BTECCE22505:: Operating Systems Lab

Teaching Scheme		Credits		Examination Scheme	
Lecture	0Hr./Week	Lecture	0	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	2Hr./Week	Total	1		

List of Experiments

1	Execution of basic and advanced Unix commands
2	Implement following shell programs a. To find out if a given string is a palindrome or not. b. To sort numbers of a given array using bubble sort
3	Generate a student report using Awk programming
4	Solve the Readers-Writers problem a. using threads and semaphores b. using threads and mutex
5	Solve the Producers-Consumers problem a. using threads and semaphores b. using threads and mutex
6	Implement the Dining Philosopher's problem using Multithreading
7	Implement Banker's Safety algorithm for Deadlock Avoidance
8	Simulate the following CPU scheduling algorithms: a. First come First serve b. Shortest Job First (Non-preemptive) c. Shortest Job First (Preemptive) d. Round Robin e. Priority (Non-preemptive) f. Priority (Non-preemptive) (Draw the Gantt charts and display the finish time, turnaround time, waiting time for each process)
9	Simulate the following page replacement algorithms a. FIFO b. LRU c. OPT
10	Write a program to simulate the following disk scheduling algorithms: a. SSTF b. SCAN c. C-SCAN d. FCFS

BTECCE22503: Computer Networks

Course Type	PCC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	100
Total	3 Hr./Week	Total	3		

Course Description

This course will help students to understand characteristics and suitability of various communication protocols. It will also highlight the basics of transport protocols programming for different applications and help students to gain insight into design and deployment of Computer Networks.

Course Outcomes

CO No.	Statement
1	Analyze the design issues of data link layer.
2	Evaluate the different aspects of media access control protocol.
3	Learn and understand various Network layer Protocols.
4	Implement socket programming suitable for connection oriented and connection less protocols.
5	Understand application level protocol.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	2																AP
CO2		2															AP
CO3						3											AN
CO4							3										AN
CO5															3		AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Introduction to Physical Layer and Data Link Layer	Hours 9	CO	BTL
Transmission media: Guided/Bounded - Twisted Pair, Coaxial and Fiber-optic cables, Ethernet. Overview of protocol suite: OSI and TCP/IP, infrastructure network, ad-hoc network. Data Link Layer: Design Issues, Error Detection and correction, Examples on Checksum,			1	AP

Stop-and-Wait protocol, Sliding Window protocols, HDLC. Point-to-Point-Access (PPP): Frame format, Transition states, PPP Stack: LCP, NCP.				
Unit No 2	Medium Access Control	Hours 9	2	AP
Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, WDMA. Ethernet: Cabling, MAC sub-layer protocol, Logical link control, Wireless LAN, Broad band wireless, Bluetooth.				
Unit No 3	Network Layer	Hours 9	3	AN
Design Issues, Packet switching, Connectionless and Connection-oriented Services, Virtual Circuit and Datagram Subnets. Autonomous system. Routing Algorithms: Optimality principle, shortest path routing, flooding, Distance Vector routing, link state routing, hierarchical routing. Congestion Control and QOS: General Principles, Congestion prevention policies, Load shading, Jitter Control, Quality of Service, Internetworking. Network layer Protocols: ARP, RARP, IP protocol, IPV6, ICMP, Unicast Routing Algorithms: RIP, OSPF, BGP, Multicast Routing: IGMP, Mobile IP.				
Unit No 4	Transport Layer	Hours 9	4	AN
Services and service primitives, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery. UDP: Introduction, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management, Transmission policy, congestion control, timer management, RPC, Transport layer in Mobile network, Socket Programming.				
Unit No 5	Application Layer	Hours 9	5	AP
Domain Name System (DNS) and DNS servers, MIME, SMTP, Mail Gateways, Remote login, File Transfer Protocol, SNMP, DHCP, HTTP, Telnet.				

Textbooks

1	Kurose, Ross, “Computer Networking-a top down approach featuring the internet “, Pearson Education.
2	Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, PHI, ISBN 81-203-2175-8.

Reference Books / Journal Articles / Weblink

1	Forouzan B, “Data communication and Computer Networks”, Tata McGraw Hill)
2	Olifer&Olifer ,”Computer Networks-principles, technologies & protocols for network design”, Wiley
3	Comer D, “Computer networks and internet”, Pearson Education

BTECCE22506: Computer Networks Laboratory

Teaching Scheme		Credits		Examination Scheme	
Lecture	0Hr./Week	Lecture	0	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	2Hr./Week	Total	1		

List of Experiments

1	Set up a small network of 2 to 4 computers using Switch. It includes installation of LAN Cards, Preparation of Cables, Assigning IP addresses and sharing C drive.
2	Studying Linux and Windows network commands. [ping, pathping, ipconfig/ifconfig, arp, netstat, nbtstat, nslookup, route, traceroute/tracert, nmap, etc]
3	Using a Network Simulator (e.g. packet tracer) Configure subnetting and supernetting
4	Configuration of router by using router commands and implement static routing
5	Configuration of router for implementation of RIP protocol
6	Configuration of router for implementation of OSPF protocol
7	Configuration of Wireless access point/Router with static IP addressing and DHCP with MAC security and filters.
8	Installing and configuring DHCP server for Linux/Windows.
9	Socket Programming for TCP Client and TCP Server.
10	Socket Programming for UDP Client, UDP Server.
11	Configuration of FTP server on windows

BTECCE22504:: Systems Programming

Course Type	PCC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	100
Total	3 Hr./Week	Total	3		

Course Description

This course will help students to identify the roles of different system software such as Assembler, Macro-processor, Loaders/Linkers and Compilers. It will also illustrate the working of Device drivers and TSR. Highlights on design and develop useful system software.

Course Outcomes

CO No.	Statement
1	Discriminate among different System software and their functionalities.
2	Design language translators like Macro processor and Assembler.
3	Develop approaches and methods for implementing compiler, linker and loader.
4	Use LEX tool for lexical analysis.
5	Interpret the techniques of implementing utility software.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	2																UN
CO2		2															AP
CO3						3											AN
CO4							3										AP
CO5															3		AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Introduction to System Software	Hours 10	CO	BTL
	<p>System Software : Need of System Software, Software types, software hierarchy, Components of System Software, Programming languages and Language Processing activities, Machine structure, Interfaces, address space, Levels of system software , Data structures for language processing.</p> <p>Assembler: Elements of assembly language programming, Design of the assembler. A simple Assembly Scheme, Types of assemblers, Pass structure of Assemblers, Variants of Intermediate code, Design of Two Pass Assembler and Single pass assembler. Multi-pass assemblers.</p>		1	UN
Unit No 2	Macro Processor	Hours 8	2	AP
	<p>Macros : Macro definition and call, macro expansion, Nested Macro calls, Design of macro processor, Design issues of macro processors, Design of two-pass macro processors, Advanced Macro Facilities, Conditional expansion, Nested macro calls , Macro expansion records.</p>			
Unit No 3	Linkers and Loaders	Hours 9	3	AN
	<p>Linkers: Relocation and linking concepts, static and dynamic linker, Subroutine linkages, Self-relocating programs.</p> <p>Loaders: Loader schemes: Compile and Go General loader scheme, Absolute loaders, Relocating loaders, Direct linking loaders, Overlay Structure. Dynamically Linked libraries.</p>			
Unit No 4	Compilers	Hours 9	4	AP
	<p>Compiler vs. Interpreter, Phase structure of Compiler and Compilation process, Tokens, Lexemes and Patterns, Types of Compilers. Lexical Errors, Regular definitions for the language constructs & strings, sequences.</p> <p>Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, and Overview of parsing, types of parsers. Case Study of LEX specifications and features.</p>			
Unit No 5	Device drivers and TSR Programming	Hours 9	5	AN
	<p>Device drivers – concepts, design and developing, Types of Drivers, Driver History, Device driver design Issues, Kernel Level Device drivers, Virtual device drivers (VxD), Device Driver Stack , Static Device drivers, Dynamic Device drivers.</p> <p>Text editor – types of editors, types of files, features and examples.</p> <p>Debugger – functions of a debugger, hardware support for debugging, example debuggers.</p> <p>TSRs: Types, Structure, details of TSR loading, writing TSRs.</p>			

Textbooks

1	“Systems Programming and Operating Systems”, M. Dhamdhere, Tata McGraw-Hill, ISBN 13:978-0-07-463579-7, Second Revised Edition.
2	“Systems Programming”, J. J. Donovan, McGraw-Hill, ISBN 13:978-0-07-460482-3, Indian Edition.

3	“Compilers Principles, Techniques and Tools”, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Addison Wesley, ISBN: 981-235-885 - 4, Low Price Edition.
4	“Advanced MSDOS programming”, Ray Duncan, Microsoft press.

Reference Books / Journal Articles / Weblink

1	“System Software An introduction to Systems Programming”, Leland L. Beck, Pearson Education, ISBN13: 9788177585551
2	"Linux System Programming", Robert Love; O'Reilly, ISBN 978-0-596-00958-8
3	"Easy Linux Device Driver", Mahesh Jadhav; High Tech Easy publishing, Second edition.

BTECCE22507::Systems Programming Lab

Teaching Scheme		Credits		Examination Scheme	
Lecture	0Hr./Week	Lecture	0	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	2Hr./Week	Total	1		

List of Experiments

1	Design suitable data structures and implement Pass-1 of a two-pass assembler for hypothetical machine. Generate symbol table and Intermediate code file. Implementation should consider 1. Sample instructions from each category and few assembler directives. 2. Forward references 3. Error handling: symbol used but not defined, invalid instruction/register etc
2	Design suitable data structures and implement Pass- 1 of a two-pass assembler for hypothetical machine. Generate Literal table, Pool table and Intermediate code file. Implementation should consider sample instructions from each category and few assembler directives and error handling.
3	Design suitable data structures and implement Pass-2 of a two-pass assembler for hypothetical machine. Consider the output of Assignment-1 (intermediate code file and symbol table) as input for this assignment.
4	Design suitable data structures and implement simple Macro definition processing for hypothetical machine. Generate different Parameter Tables and MDT, MNT.
5	Implement simple Macro expansion based on Assignment 4. Assume input as macro call to macros defined in Assignment 5.
6	Design a lexical analyzer for 'C' language.

BTECCE22508:: Data Warehouse and Data Mining

Course Type	PCC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3Hr./Week	Lecture	3	CIE Marks	50
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	0Hr./Week	Practical/Studio	0	Total Marks	100
Total	3Hr./Week	Total	3		

Course Description

This course will introduce the concepts of data warehouse and data mining, which gives a complete description of the principles, used, architectures, applications, design, and implementation of data mining and data warehousing concepts.

Course Outcomes

CO No.	Statement
1	Understand the fundamental concepts of data warehousing.
2	Develop a model for data warehousing.
3	Learn multidimensional modelling techniques.
4	Evaluate the performance using data mining and association rules.
5	Analyze performance using classification and clustering.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1		3															UN
CO2				3													AP
CO3					2												AN
CO4							2										AP
CO5																3	AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Introduction to Data Warehousing	Hours 9	CO	BTL
	What is a Data Warehouse, Need of Data Warehouse, why warehouse is separated from operational databases, Data Warehouse Features, Types of Data Warehouse (Virtual Warehouse, Data mart, and Enterprise Warehouse), Data Warehouse Architecture, Inmon & Kimball architecture? What is ETL, Process of ETL, Need of ETL, and Challenges in ETL system A perspective on decision support applications.		1	UN
Unit No 2	Data Warehousing and Modelling	Hours 9	2	AP
	Introduction to Data Warehouse Modelling, Differentiating the Warehousing model from the OLTP model, Warehouse Modelling Approaches, E-R v/s dimensional data Modelling, Dimension tables, Types of dimensions- Small, Conformed, junk, role-playing, degenerate, slowly changing dimension table, Fact tables, Load plan for Fact tables, types of facts. Transaction, periodic snapshot fact table, Accumulating fact tables, factless fact table & Conformed fact tables.			
Unit No 3	Multi-Dimensional Modeling-Methodology	Hours 9	3	AN
	OLAP – Online Analytical Processing, differentiate between OLAP and OLTP, Types of OLAP servers, Basic OLAP Operations (Roll-up, Drill-down, Slice and Dice, Pivot rotate), Data warehouse schemas, Multi-Dimensional Model Structures, Solution Validation Techniques, Detailed Dimension Modelling, R-OLAP, M-OLAP			
Unit No 4	Data Mining with Association Rule	Hours 9	4	AP
	Introduction to Data Mining: Introduction, what is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of similarity and dissimilarity-Basics, Text Mining. Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.			
Unit No 5	Classification and Clustering	Hours 9	5	AN
	Classification: Problem definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees-Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest neighbor classification-Algorithm and characteristics. Clustering: Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection			

Textbooks

1	<i>Sam Anahory, Dennis Murray, "Data Warehousing in the Real World – A Practical Guide for Building Decision Support Systems", Pearson Education, 2006.</i>
2	<i>Jiawei Han, Micheline Kamber, and Jian Pei "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.</i>
3	<i>Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining", Pearson Education.</i>

Reference Books / Journal Articles / Weblink

1	<i>Data Warehousing and Mining: Concepts, Methodologies, Tools and Applications (Vol I to VI) by John Wang</i>
2	<i>The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, 3rd Edition by Ralph Kimball and Margy Ross</i>
3	<i>Data Mining and Data Warehousing by Bharat Bhushan Agarwal and Sumit Prakash, Tayal Laxmi Publications</i>
4	<i>Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.</i>

BTECCE22509:: Data Warehouse and Data Mining Lab

Teaching Scheme		Credits		Examination Scheme	
Lecture	0Hr./Week	Lecture	0	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	2Hr./Week	Total	1		

List of Experiments

1	Study a project for a chain of home entertainment rental stores and identify different analytical questions needed to be answered for the given case study.
2	<p>Consider an order management operational database that tracks order numbers, dates, the requested ship dates, customers and their shipping and billing addresses, products and their quantity and gross dollar amount, sales representatives that take and process orders, the deals (promotions) and discounts proposed/offered to customers.</p> <p>You have to design a data warehouse that will be updated from the above operational database and should support decision making by helping to answer analytical questions about the net order dollar amounts per customer, products, promotions or deals, and the performance of their sales representatives or agents.</p> <p>Analysis of requested ship dates is important for analysis as well. It is also important to allow for performing order amount analysis in various currencies: dollars, dirhams, euros.</p> <p>1) Draw the star schema(s) showing the main attributes, including primary keys, foreign keys, and facts.</p> <p>2) Insert appropriate values in the database. Write one SQL statement that runs on your schema and returns the net order dollar amount per customer, products, promotions, and performance of sales representatives.</p> <p>3) Make necessary assumptions to compute an approximate size (in MB) of your DW over 5 years.</p>
3	Consider a book management operational database that tracks different book types, cost, quantity, profit, location, authors and their age and country, publication name and their country and year. You have to design a data warehouse that will be updated from the above operational database and should support

	decision-making by helping to answer analytical questions about the quantity and profit made per book type, location, author, and publication. 1) Draw the star schema(s) showing the main attributes, including primary keys, foreign keys, and facts. 2) Insert appropriate values in the database. Write SQL statements that runs on your schema and return the quantity and profit made per book type, location, author, and publication.
4	Gather Business Requirements for Banking enterprise and design it using any multi-dimensional data model namely Star, Snowflake, or Galaxy schema.
5	Gather Business Requirements for Healthcare enterprise and design it using any multi-dimensional data model namely Star, Snowflake, or Galaxy schema.
6	Implement the Apriori Algorithm.
7	Implement a k-means Clustering Algorithm.
8	Implement a Hierarchical Clustering Algorithm.
9	Implement a Naive Bayesian Classification Algorithm.
10	Implement Decision Tree Algorithm.

BTECCE22510:: Economics

Course Type	HSMC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2Hr./Week	Lecture	2	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	-
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	50
Total	2Hr./Week	Total	2		

Course Description

This course helps the student to gain the knowledge of basic concepts of economics and microeconomics. It will also focus on concepts like demand and supply analysis in view of market analysis. It will identify consumer behavior and their relationships with consumer satisfaction.

Course Outcomes

CO No.	Statement
1	Understand the causes and consequences of market failure by analyzing basic concepts from economics.
2	Apply microeconomics terms to analyze market condition.
3	Analyze the correlation between demand and supply so as to analyze market conditions.
4	Apply the knowledge of consumer behavior to infer how useful or good or valuable a service to a consumer.
5	Understand the factors that directly affect on overall well-being of people in the economy.

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1									2								UN
CO2										2							AP
CO3											2						AP
CO4												2					AP
CO5															1		AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Economic Concepts	Hours 6	CO	BTL
	Basic Economic problems, Economics and Decision Making. Circular flow of Economy, Objectives of a firm. Invisible hand, Types of Economy, Market failure and role of Government in Market Failure. Principal Agent problem		1	UN
Unit No 2	Microeconomics Concept	Hours 10	2	AP
	Demand and Determinants of Market Demand, Supply, Elasticity of Demand – (Price and Income). Market equilibrium. Production - Production Function – Law of Variable Proportions - Law of Returns to Scale - Economies of Scale – Cost Analysis – Types of Costs i) Total cost ii) Average Cost iii) Marginal Cost iv) Opportunity cost. Market Structures: Perfect and Imperfect competition Price and output determination under a) Perfect Competition b) Monopolistic Competition c) Monopoly Competition (Government regulated and unregulated) d) Oligopoly			
Unit No 3	Supply and Demand	Hours 5	3	AP
	Demand, Determinants of Demand, Supply, Determinants of Supply, Market equilibrium, Elasticity of Demand (Income, Price and cross elasticity).			
Unit No 4	Consumer Behavior	Hours 5	4	AP
	a) Marginal Utility Approach - Limitations b) Indifference Curve Analysis - Concept - Characteristics - Consumer Equilibrium			
Unit No 5	Welfare Economics	Hours 5	5	AP
	Introduction to welfare Economics, Concept, Problems in measuring welfare			

Textbooks

1	Principles of Economics , Copyright Year: 2016 ISBN 13: 9781946135162, Publisher: University of Minnesota Libraries Publishing
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BTECCE22511:: Project Management

Course Type	HSMC	Semester	5
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2Hr./Week	Lecture	2	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	0
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	50
Total	2Hr./Week	Total	2		

Course Description

This course helps the student to understand the project planning, budgeting process. It will also focuses on risk analysis, creation of effective and deliverable project plans. It will also identify roles and work with cross functional teams.

Course Outcomes

CO No.	Statement
1	Understand the basics of Project Management and importance of knowledge areas
2	Estimate scope and time factor for project.
3	Implement Project Quality factors
4	Analyze Human Resource requirements
5	Predict risks associated with Project Management activities

Mapping of COs to POs and PSOs

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1									3								UN
CO2										3							AP
CO3											3						AP
CO4												2					AP
CO5															1		AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

Course Content

Unit No 1	Introduction to Project Management	Hours 6	CO	BTL
	What Is a Project? Project Attributes, The Triple Constraint, Project Stakeholders, Project Management Knowledge Areas, Project Management Tools and Techniques, Project Success, The Role of the Project Manager, Project Manager Job Description, Suggested Skills for Project Managers, Importance of People and Leadership Skills, Project Integration Management, Developing a Project Charter, developing a Project Management Plan, Performing Integrated Change Control, Change Control on Information Technology Projects, Change Control System, Closing Projects, or Phases.		1	UN
Unit No 2	Project scope and time management	Hours 6	2	AP
	What Is Project Scope Management? Collecting Requirements, Documenting Requirements, Defining Scope, Work Breakdown Structure, Approaches to Develop WBS, The WBS Dictionary and Scope Baseline, Verifying Scope, Controlling Scope, The Importance of Project Schedules, Defining Activities, Sequencing Activities, Dependencies, Network Diagrams, Estimating Activity Resources, Estimating Activity Durations, Developing the Schedule, Gantt Charts, Critical Path Method, Critical Chain Scheduling, Program Evaluation and Review Technique (PERT)			
Unit No 3	Project cost and quality	Hours 6	3	AP
	The Importance and Basic Principles of Cost Management, Types of Cost Estimates, Cost Estimation Tools and Techniques, Typical Problems with Information Technology Cost Estimates, Determining the Budget, The Importance of Project Quality Management, Planning Quality, Performing Quality Assurance, Performing Quality Control, Tools and Techniques for Quality Control, Deming 14 Points, Juan principles, Crosby principles, Ishikawa model, Taguchi and Robust Design Methods, Feigenbaum principles, ISO Standards, PDCA cycle, The Cost of Quality, Maturity Models			
Unit No 4	Human resource & communication management	Hours 6	4	AP
	Developing the Human Resource Plan, Project Organizational Charts, Responsibility Assignment Matrices, Staffing Management Plans and Resource Histograms, Acquiring the Project Team, Resource Assignment, Resource Loading, Resource Leveling, Developing the Project Team, Training, Team-Building Activities, Managing the Project Team, Tools and Techniques for Managing Project Teams, Project Communications Management, Identifying Stakeholders, Planning Communications Distributing Information, Formal and Informal Methods for Distributing Information, Selecting the Appropriate Communications Medium, Managing Stakeholders, Reporting Performance			
Unit No 5	Project risk management	Hours 6	5	AP
	The Importance of Project Risk Management, Planning Risk Management, Common Sources of Risk on Information Technology Projects, Identifying Risks, Suggestions for Identifying Risks, The Risk Register, Performing Qualitative Risk Analysis, Using Probability/Impact Matrixes to Calculate Risk Factors, Top Ten Risk Item Tracking, Performing Quantitative Risk Analysis, Decision Trees and Expected Monetary Value, Simulation, Sensitivity Analysis, Planning Risk Responses, Monitoring and Controlling Risks			

Textbooks

1	Information Technology Project Management, Kathy Schwalbe, Sixth Edition, Course Technology, ISBN-13: 978-1-111-22175-1, ISBN-10: 1-111-22175-8
2	Software Project Management, A United Framework, Walker Royce
3	Essentials of Software Project Management, second edition, Richard Bechtold (Author) Publisher: Management Concepts; second edition (April 12, 2007) ISBN-10:1567261868 ISBN-13: 978-1567261868
4	Software Project Management, Bob Hughes, Mike Cotterill Publisher: McGraw-Hill Publishing Co.; 4Rev Ed edition (November 1, 2005) ISBN-10: 0077109899 ISBN-13-978-0077109899

Reference Books / Journal Articles / Weblink

1	Quality Software Project Management, Robert T. Futrell, Donald F. Shafer, Linda I. Shafer Publisher: Prentice Hall PTR; 1st edition (January 24, 2002) ISBN-10: 0130912972 ISBN-13: 978-0130912978
2	Software Engineering Project Management, 2nd Edition, Edward Yourdon, Richard H. Thayer Publisher: Wiley-IEEE Computer Society Pr; 2 Sub edition (May 10, 2000) ISBN-10: 0818680008 ISBN-13: 978-0818680007
3	Software Engineering, Ian Sommerville, 8th Edition, Addison-Wesley, 2006, ISBN-10: 0321313798, ISBN-13: 9780321313799
4	Software Engineering: A Practitioner's Approach, 6/e, Roger S Pressman, McGraw Hill, 2005, ISBN: 0072853182